We determined the relationships between winter cereal yields and the monthly sum of precipitation and monthly mean temperatures during the growing season. The work is based on average grain yields of winter triticale and rye from the years 1998–2010 obtained from the Zawady Experimental Farm owned by the University of Natural Sciences and Humanities in Siedlec. The relationship between yield and the thermal and precipitation conditions was described with linear correlation coefficients $r$ and equations of multiple linear regression. The relationships were analysed over the whole growing season and in selected growing stages (autumn growth, rest period, spring initiation of growth, stage of grain formation and maturation).

The regression model for the whole growing season showed that winter triticale yields (in over 30%) depended on the temperature in December and March and on precipitation in June (in almost 40%), January (21%) and May (18%). The relationships between cereal yields and temperature and precipitation in individual growth periods were parabolic in most cases. Triticale yield was significantly affected by temperature during the autumn growth stage and the period of rest and by precipitation in the period of rest and spring growth. No such relationships were found for rye.

Moreover, the multiple regression procedure was found to be useful when constructing “weather-yield” equations. The models obtained for the whole growing season with the stepwise regression procedure described very well the relationship between yields and thermal and precipitation conditions for both rye and winter triticale. Poorer fit of empirical data to the model functions were obtained for equations describing the relationship between cereal yields and thermal and precipitation conditions during individual growth stages.